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SSIC 5000-33a

**FINAL TECHNICAL MEMORANDUM REGARDING EXPANDED REMEDIAL  
INVESTIGATION FOR PER OR POLYFLUOROALKYL SUBSTANCES IN SOIL,  
SEDIMENT, SURFACE WATER AND GROUNDWATER WORK PLAN SITE 34  
DRUM DISPOSAL AREA NAS PATUXENT RIVER MD**

05/04/2018  
CH2M HILL

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# Expanded Remedial Investigation for PFAS in Soil, Sediment, Surface Water, and Groundwater Work Plan, Site 34-Drum Disposal Area, NAS Patuxent River, St. Mary's County, Maryland

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File

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## Introduction

This technical memorandum (TM) presents the rationale for additional soil, sediment, surface water, and groundwater sampling as part of the Expanded Remedial Investigation (RI) at Environmental Restoration (ER) Site 34-Drum Disposal Area at Naval Air Station Patuxent River (NASPR) in St. Mary's County, Maryland. The data collected during this additional investigation activities will be used to further characterize the nature and extent of PFAS contamination in soil, sediment, surface water, and groundwater at Site 34.

Following the review of the June 2017 PFAS well installation and groundwater sampling results as part of the Expanded RI for Site 34, the NASPR Tier 1 Partnering Team decided additional site investigation was warranted to refine the conceptual site model (CSM) for PFAS and to screen risks to human health as a result of releases from the historical Pail Disposal Area or Area A.

The objectives of this Expanded RI for PFAS are to: 1) determine the nature and extent of PFAS in soil, sediment, surface water, and groundwater at Site 34, 2) screen to the extent possible the human health risk associated with soil, sediment, surface water, and groundwater, and 3) refine the CSM. The results of this additional investigation will ultimately be used to support a human health risk assessment for Site 34 once there are more risk values for the PFAS compounds.

After regulatory review and acceptance of this TM by the NASPR Tier 1 Partnering Team, the approach and further details on the data usability, data acceptance criteria, data quality objectives, project decision statements, data validation, and schedule will be documented in a UFP-SAP prior to sampling efforts.

## Site Location and History

NASPR (also referred to as the Station) is located in southern Maryland, at the confluence of the Patuxent River and Chesapeake Bay. Site 34 is located in the southern portion of the station (**Figure 1**), and occupies approximately 20 acres of partially cleared land located immediately west of the former sanitary landfill known as Site 11 (**Figure 2**). An underdeveloped forested area lies north of the site. The site is bordered to the south by the Site 11 access road and an open grassy area. The fence and locked gates restrict site access to Site 34, and the area is routinely patrolled by Navy security.

Site 34 was used as a borrow pit for the excavation of sand gravel; subsequently construction debris and soil were deposited on the site. The timeframe over which the site was used as a fill area are unknown. During construction of the Site 11 landfill cap in 1996, a portion of the eastern hillside of Site 34 was excavated. This excavation revealed several buried 5-gallon plastic containers in the area called Area A (Pail Disposal Area) (**Figure 3**).

In September 1996, as a result of the discovery of the plastic containers, test pits were excavated and soil samples were collected for laboratory analyses. Additional metal drums and soil saturated with the container contents also discovered after a geophysical survey was performed in the area and during test pits of the anomalies. The area with the metal drums north of Area A was known as the Drum Disposal Area or Area B (**Figure 3**). In October 1997, an interim removal action was conducted in Areas A and B. It was during this removal action that an excavated blue plastic container had a partially legible label indicating it contained a fire-extinguishing agent, which could possibly contain PFAS. At that same time, the NASPR fire marshal stated that the black oily appearance and distinctive odor were not consistent with fire-extinguishing agent. Analytical results of the black substance showed that several common solvents and degreasers were present in the mixture.

In 2008, based on a review of historical aerial photographs, the Navy identified an area immediately west of the original boundary of Site 34 with evidence of possible environmental impact; suspect borrow area was identified. Consequently, the Navy decided to expand the area of Site 34 to include the suspect borrow pit area in the western portion of Site 34 (**Figure 2**). As required by the Federal Facility Agreement (USEPA and Navy, 2001), an RI was conducted to identify the source of the geophysical anomalies previously identified at the site and define the nature and extent of any chemical constituents in site media (soil, sediment, surface water, and groundwater) that could pose an unacceptable risk to human health or the environment. RI activities were conducted in phases. In 2010, an additional surface geophysical survey was completed at Site 34 in the suspect borrow pit area identified in historical aerial photographs. Immediately before starting the survey, surface debris located throughout the site was removed to improve site accessibility and prevent interference with the instruments used for the survey. Seventeen dispersed subsurface geophysical anomalies were identified at Site 34 and are shown in **Figure 3**.

In March 2012, as part of the RI activities, groundwater samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and total and dissolved metals (including mercury, cyanide, and hexavalent chromium). PFAS were not sampled during this March 2012 event.

In June and October of 2015, the Team agreed to conduct additional well drilling and groundwater sampling to determine the presence or absence of PFAS in groundwater at Site 34. The characterization was based upon the historical evidence of a buried container that may have contained fire-extinguishing agent containing PFAS. In June 2017, the groundwater sampling was completed for three PFAS compounds (PFOS, PFOA, and PFBS) at two newly installed monitoring wells and nine existing monitoring wells (**Figure 4**). PFOS and PFOA were detected across the site and at concentrations above the USEPA Health Advisory Level of 70 ng/L (parts per trillion) for total PFOS and PFOA in nine of the eleven groundwater samples. During the October 2017 and April 2018 Partnering Meetings, the Team reviewed the groundwater sampling locations and detections and decided additional sampling was warranted to define the nature and extent of PFAS in not just groundwater but also soil, sediment, and surface water. If additional characterization is deemed to be necessary by the Partnering Team, Phase II of this Expanded RI will be conducted to include monitoring well installation, conventional groundwater sampling, and sampling of other site media as necessary.

## Investigation Approach

In conjunction with this TM, a UFP-SAP will be prepared to document the details and specifics of this investigation approach for Site 34. As mentioned previously, objectives of this Expanded RI for PFAS are to:

1. determine the nature and extent of PFAS in soil, sediment, surface water, and groundwater at Site 34;
2. screen to the extent possible the human health risk associated with soil, sediment, surface water, and groundwater; and
3. refine the CSM.

The results of this additional investigation will ultimately be used to support a human health risk assessment for Site 34 once there are more risk values for the PFAS compounds. Proposed soil, sediment, surface water, and groundwater sample locations were selected using previous PFAS results and discussions with the NASPR Tier 1 Partnering Team.

## Sediment, Surface Water, and Soil Sample Collection

Three sediment sample locations will be collected at two locations downgradient of Area A in the drainage area between Sites 34 and 11 and one location upgradient of Area A at the start of the drainage area. Sediment samples will be collected using hand tools at the three locations. If surface water is available at the time of sampling, three surface water samples will be collected at each of the three sediment sample locations. Forty-two soil samples will be collected from twenty-one locations using direct-push technology (DPT). Soil samples will be co-located with the twenty-one boring locations of the grab groundwater samples (**Figure 5**). Soil samples will be collected at two depths per DPT boring: surface or 0-1 feet below ground surface (bgs) and directly above the water table. Subsurface soil samples will not be collected deeper than the water table. Sediment and soil sampling will be performed in general accordance with the methods and procedures that will be documented in the upcoming UFP-SAP.

## Grab Groundwater Sample Collection

Twenty-one grab groundwater samples will be collected from the twenty-one boring locations using DPT and temporary well screens (**Figure 5**). Grab groundwater samples will be collected using a peristaltic pump and low-flow sampling technique. Field parameter measurements will be collected using a Horiba U-22 (or equivalent) equipped with a flow-through cell. Turbidity, specific conductance, pH, dissolved oxygen, temperature, and oxidation-reduction potential will be measured and recorded in the field logbook at 3 to 5 minute intervals during purging activities. Once the parameters have stabilized to the criteria listed in the “Stabilization Criteria” column of **Table 1**, samples will be collected and sent to the laboratory for normal turnaround of sample results. Groundwater sampling will be performed in general accordance with the methods and procedures that will be documented in the upcoming UFP-SAP.

**TABLE 1**  
**Groundwater Stabilization Criteria**

| Parameter                          | Stabilization Criteria                                           |
|------------------------------------|------------------------------------------------------------------|
| Turbidity                          | Three consecutive readings +/- 5 % NTUs or as low as practicable |
| Specific Conductance               | Three consecutive readings +/- 3 % S/m                           |
| pH                                 | Three consecutive readings +/- 0.1 pH units                      |
| Dissolved Oxygen                   | Three consecutive readings +/- 0.2 mg/l                          |
| Temperature                        | Three consecutive readings +/- 1.0 °C                            |
| Eh (Oxidation-Reduction Potential) | Three consecutive readings +/- 15 mV                             |

The field activities for Site 34 are anticipated to occur in mid-2018 upon approval of the UFP-SAP by the Navy chemist and the NASPR Tier I Partnering Team.

## Laboratory Analysis

All samples will be collected for all 14 PFAS that are listed in the current drinking water analytical method (i.e., EPA Method 537) (Department of the Navy, 2017). Since this method is specifically for drinking water media, the laboratory selected will use LCMSMS compliant with QSM 5.1 Table B-15 to address soil, sediment, surface water, and groundwater samples from Site 34. The laboratory's standard operating procedure for this analytical method will be provided in the UFP-SAP.

Quality Control (QC) samples (i.e., trip blanks, field blanks, equipment rinsate blanks, duplicate samples, and matrix spike/matrix spike duplicate samples) will be collected at a frequency to be indicated in the UFP-SAP. Equipment blank samples will be collected from non-disposable sampling equipment at a frequency of one per day.

Samples will be collected in laboratory-prepared sampling containers, packed on ice, and shipped overnight to a certified laboratory. Laboratory reporting limits, methods, standard operating procedures (SOPs), and data verification and validation requirements will be presented in the UFP-SAP.

## Equipment Decontamination

Non-disposable sampling equipment will be decontaminated before use and immediately after each use. Equipment will be decontaminated with alternating rinses of deionized water, Alconox/Liquinox, and methanol, and allowed to dry between each use. Disposable equipment will be disposed of immediately following use.

To decontaminate all down-hole equipment prior to the start of drilling activities and between sample collection, use high pressure cleaner, hand wash with Alconox/Liquinox and washcloth, high pressure wash, rinse equipment with methanol (supplied by CH2M), high pressure wash with cleaner, and use DI rinse (supplied by CH2M). All water generated during decontamination activities will be drummed and transported to the drum storage area at Site 34 at the end of the project.

## Investigation Derived Waste

Investigation Derived Waste (IDW) for this field investigation is anticipated to consist of soil and decontamination fluids from well installation, development water from well development and purge water from well sampling. All IDW generated during the Site 34 sampling activities will be stored on site until waste characterization results are received and transportation and disposal of IDW can be scheduled.

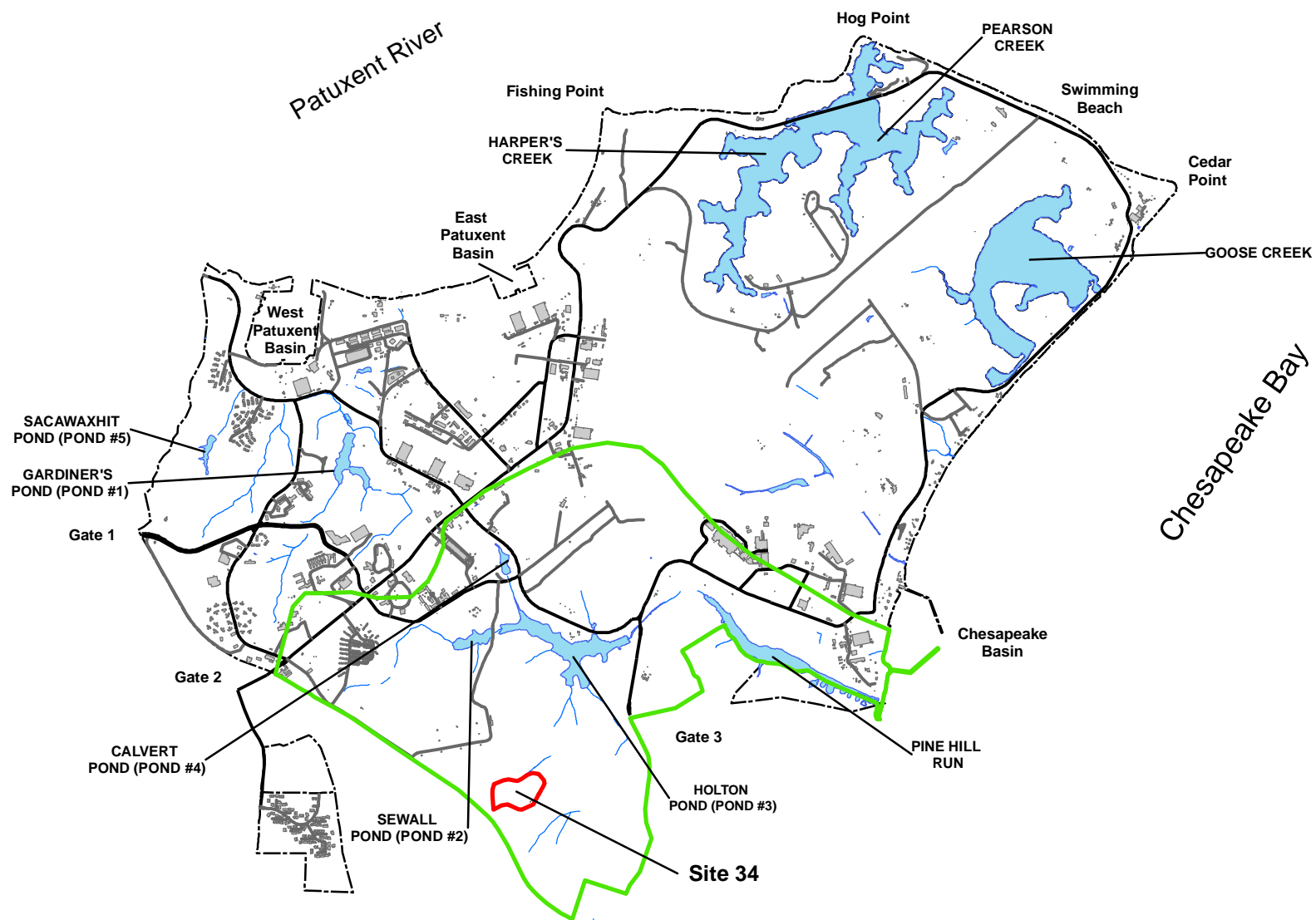
## Data Management, Evaluation and Reporting

The sampling results generated during this Expanded RI sampling event will be validated by a third-party contractor and evaluated in a human health risk screening. The results of the sampling and risk screening will be documented in a summary technical memorandum and submitted to the NASPR Tier I Partnering Team for review and comment. The findings will be used by the Team to make decisions regarding the need for further investigation, remediation, or ways for achieving site closure. Eventually, the Revised Draft RI Report (CH2M, 2015) will be revised to document events of this Expanded RI for PFAS and any subsequent action.

## References

- CH2M. 1997. *Final Work Plan/ Field Sampling Plan for Site 34 Removal Action, Naval Air Station Patuxent River, Maryland*. September.
- CH2M, 2011. *Final Uniform Federal Policy Sampling and Analysis Plan, Site 34- Borrow Pit Remedial Investigation, Naval Air Station Patuxent River, Maryland*. June.
- CH2M. 2015. *Revised Draft Remedial Investigation for Site 34. NAS Patuxent River, St. Mary's County, Maryland*. January.
- CH2M. 2016. *Final Technical Memorandum. Remedial Investigation Approach for Perfluorinated Chemicals (PFCs) in Groundwater at Site 34. NAS Patuxent River, St. Mary's County, Maryland*. January.
- CH2M. 2017. *Final Sampling and Analysis Plan for Expanded Remedial Investigation for Perfluorinated Compounds (PFCs) in Groundwater, Site 34- Drum Disposal Area, Naval Air Station Patuxent River, St. Mary's County, Maryland*. June.
- Department of the Navy. 2017. *Interim Per- and Polyfluoroalkyl Substances (PFASs) Site Guidance for NAVFAC Remedial Project Managers (RPMS)/September 2017 Update*. September.
- USEPA and Navy. 2001. *Federal Facilities Agreement Under CERCLA Section 120, Naval Air Station Patuxent River, Maryland*. Administrative Docket Number: III-FCA-CERC-017. December.





#### Legend

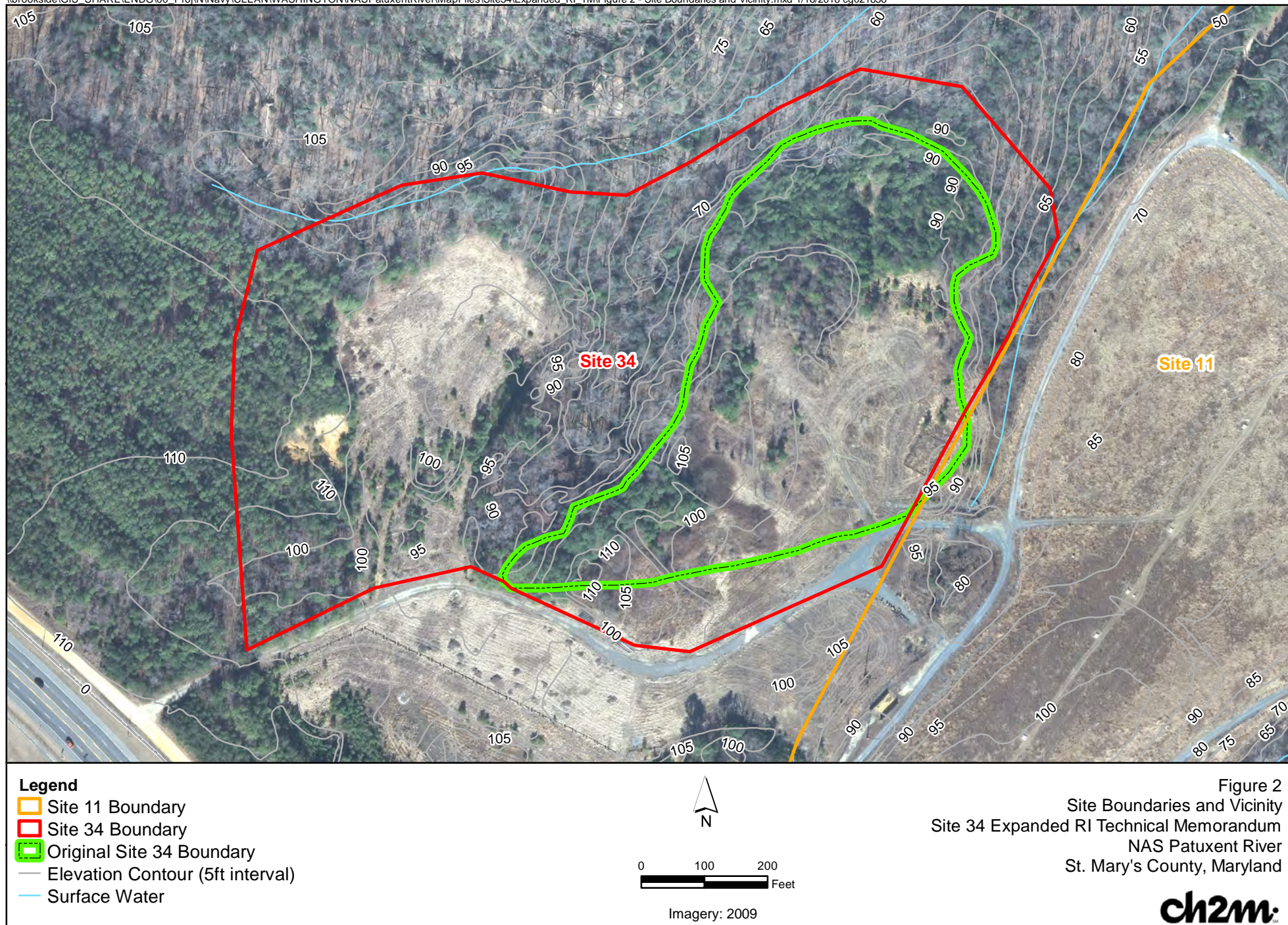
- ▭ Site Boundary
- ▭ Pine Hill Run Watershed Boundary
- ~ Stream
- ▭ Building
- ▭ Installation Boundary
- ▭ Water Body



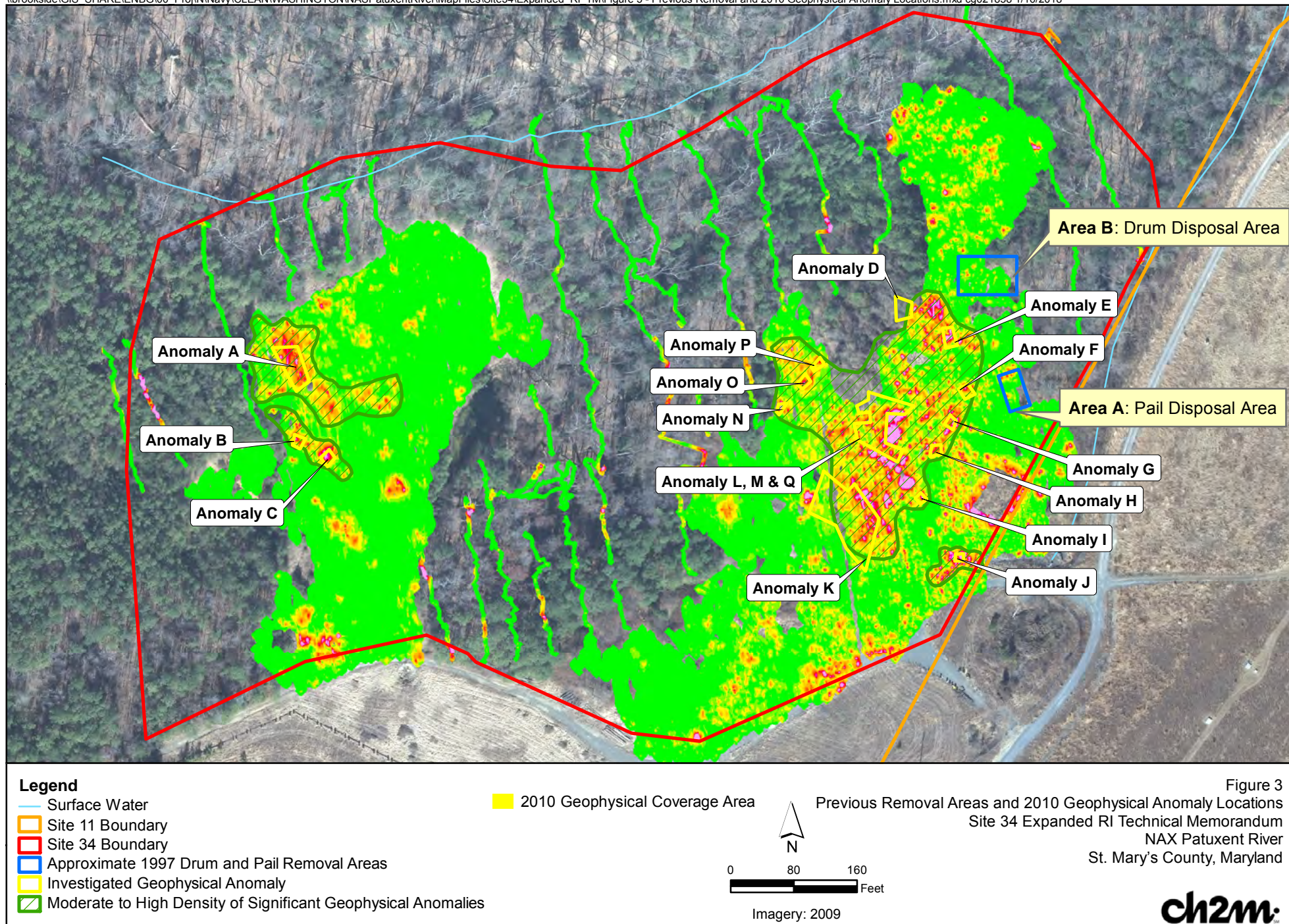
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Figure 1  
Site Location Map  
Site 34 Expanded RI Technical Memorandum  
NAS Patuxent River  
St. Mary's County, Maryland

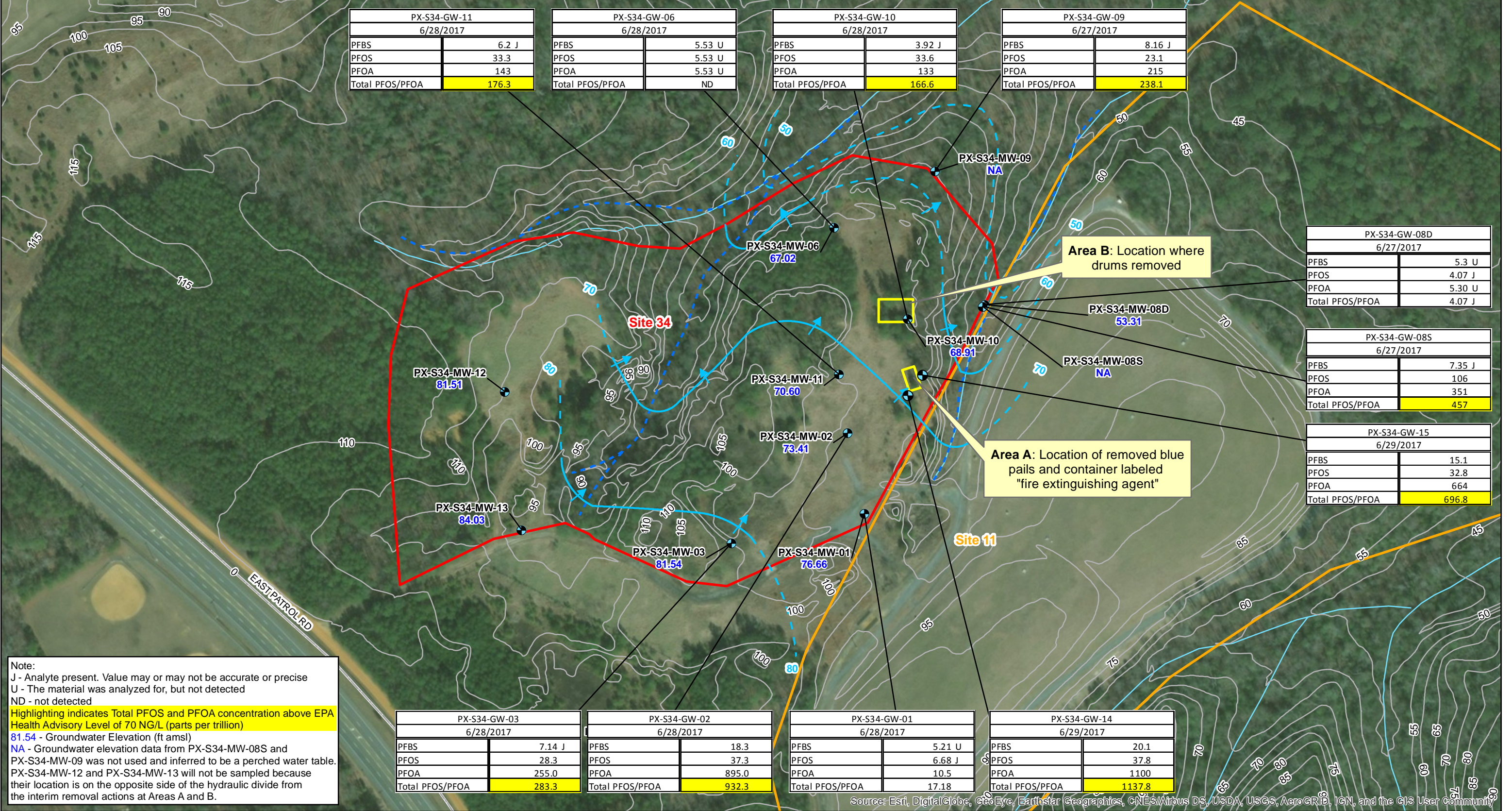












**Legend**

- Monitoring Well Location
- Potentiometric Surface (10-ft interval)
- Inferred Potentiometric Surface
- Groundwater Flow Direction
- - - Intermittent Stream
- Surface Elevation Contour (5ft interval)
- Approximate 1997 Drum and Pail Removal Areas
- Site 11 Boundary
- Site 34 Boundary

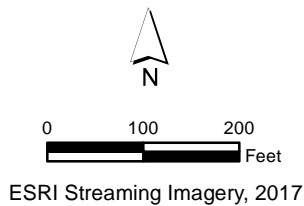


Figure 4  
June 2017 PFAS Groundwater Sampling Results in Parts Per Trillion (NG/L)  
Site 34 Expanded RI Technical Memorandum  
NAS Patuxent River  
St. Mary's County, Maryland



